

**A HIGH-SPEED BAVARIAN LOCOMOTIVE.**

BY WILLIAM MAYNER.

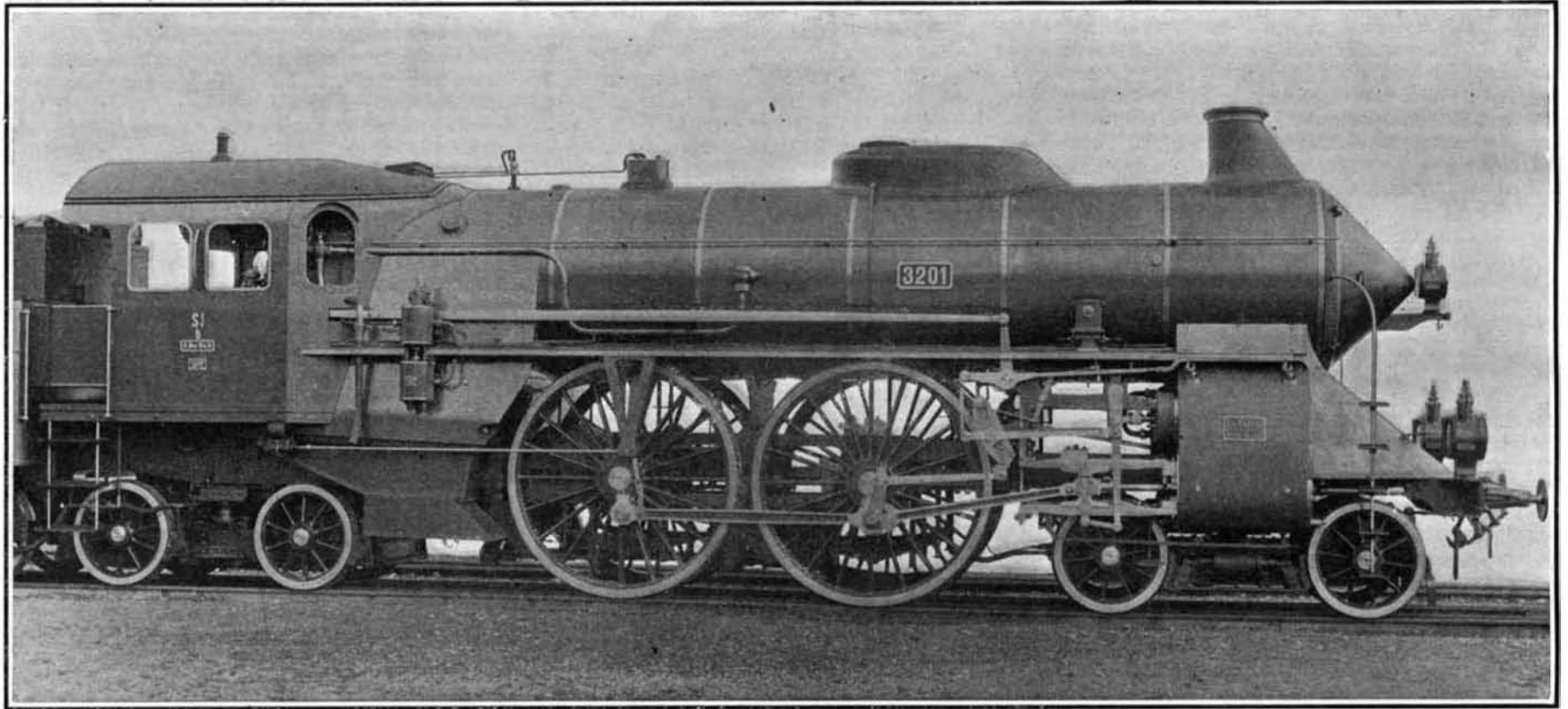
The locomotive illustrated herewith was exhibited at Nürnberg; it was designed expressly for a normal speed of 94 miles an hour. Judging from the previous results obtained with the remarkable locomotives of the same builder, J. A. Maffei, of Munich, it is highly

fastest runs that had been made in Europe up to that period. The new engines resemble somewhat the 4—4—6 Thuile locomotive of 1900. All the constructive details are very fine; the work, in fact, approaches as near to motor-car practice as is permissible in railway engines.

The new high-speed engine has four cylinders, com-

the engine has been geared up to less than 70 per cent. There is one set only of valve gears for four valves, and no intercepting-valve is introduced.

Bar frames have been employed for reasons of economy in weight. Incidentally these frames permit of ready access to all working parts placed between them. Even the coupling rod on the opposite side of the en-

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Cylinders, high-pressure and low-pressure, respectively, 16½ inches and 24 inches by 25½ inches; driving wheels, diameter, 7 feet 5½ inches; boiler, internal diameter, 5 feet 6¾ inches; total heating surface, 2,717 square feet; grate area, 50.5 square feet; boiler pressure, 205.8 pounds; total weight of engine, 92.5 tons; wheel base of engine, 33 feet 4¼ inches; total length of engine and tender, 69 feet 4 inches; capacity of tender, 8.8 tons of coal and 5,730 gallons of water.

probable that this speed can be maintained and exceeded in practical trials. It is quite another matter, however, whether Bavarian State Railways are suited for such abnormal velocities in ordinary service. Were this so, we should have long since heard of extraordinarily high speeds in the south and west German states. Already speeds of 90 miles per hour with a train of 138 tons (car load) have been attained, on a slightly rising gradient, by Maffei "Atlantic" type locomotives that were built for maximum speeds of only 75 miles per hour. Such engines were not in the high-speed steam locomotive trials of March, 1904, but they exceeded for speed and tractive power the results obtained from other engines on the special Marienfelde to Zossen line, and, in fact, accomplished some of the

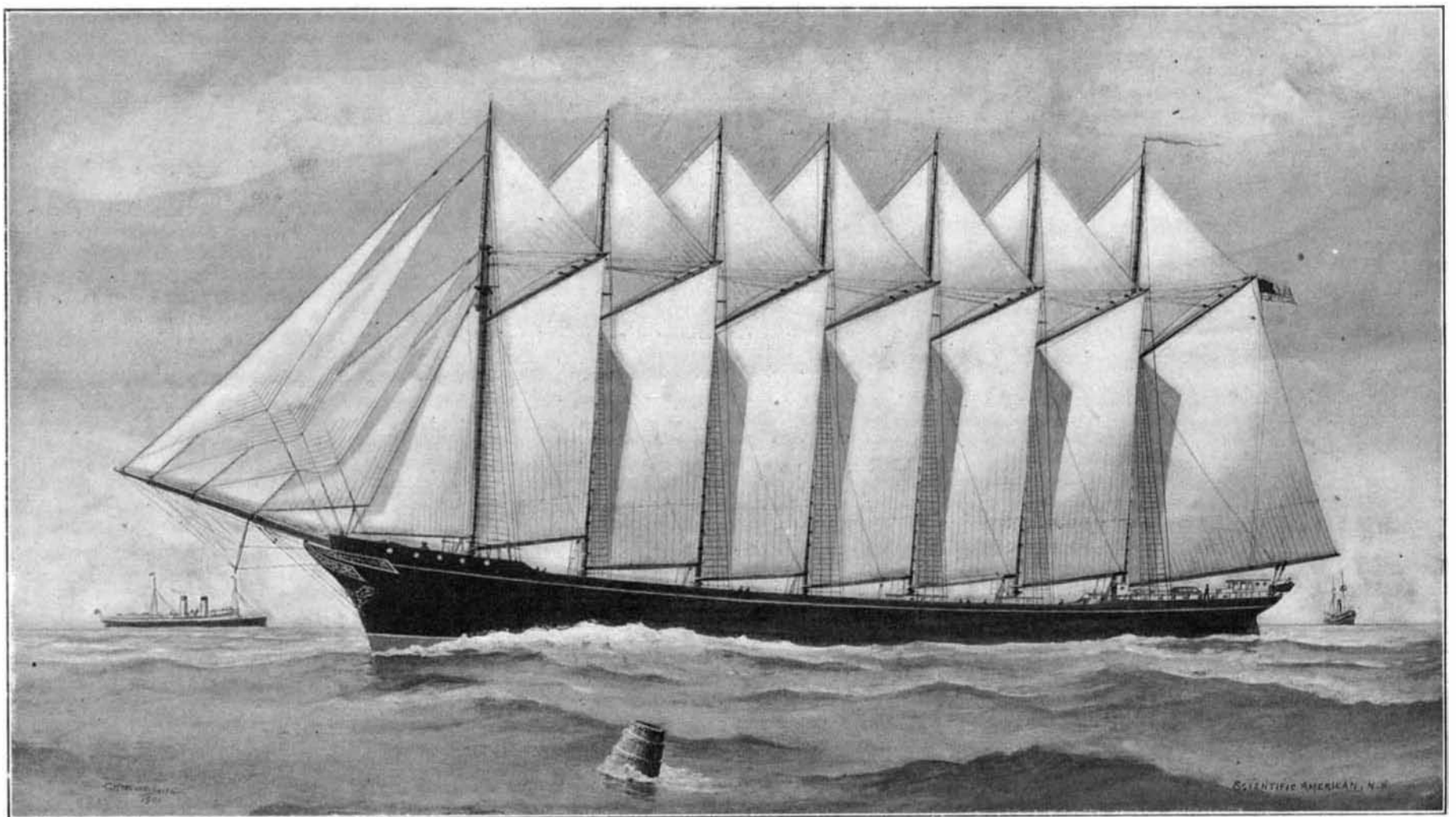
pound, with the low-pressure outside as usual, and all bolted together in one transverse line. There is one driving axle only, and the driving mechanism is nearly perfectly balanced. The small counterweights in the driving and coupled wheels show to what extent the revolving masses have been made self-balancing. The fine proportions of the driving and coupling rods contribute to the elimination of disturbing forces.

The piston valves are of large size, and have the great length usual with double-ported distributors. At each end of the low-pressure valves are two small cylindrical valves connected with the expansion gear, and these open when the cut-off exceeds 70 per cent of piston stroke, as in starting, and thus admit high-pressure steam to the low-pressure valve chests until

the engine is also discernible through the driving wheels.

All parts of the engine presenting broad surfaces at right angles to the engine have been clothed in such way that they cleave the air, and reduce the head resistance when traveling at high speed. Careful experiments on the Continent and elsewhere have proved the real saving of power thus realized. It may be added here that the engine is of great length—45 feet 2 inches—with a height to the boiler center of about 9 feet, and a total height of 15 feet.

The high-pressure cylinders have a greater volume than those of any other European locomotive, including the new Belgian engines, but the boiler pressure of the 4—4—4 engines has been reduced to 30 pounds less than that of the most recent saturated-steam loco-



Length over all, 395 feet; molded depth, 34 feet 5 inches; displacement, 10,000 tons; deadweight cargo capacity, 7,500 tons; height mainmast, step to truck, 182 feet; total sail area, 40,617 square feet.

**The Seven-Masted Steel Schooner "Thomas W. Lawson." A Type of Vessel Which Has Displaced the Square-Rigged Ship.**

**THE PASSING OF AMERICAN SQUARE-RIGGED VESSELS.**

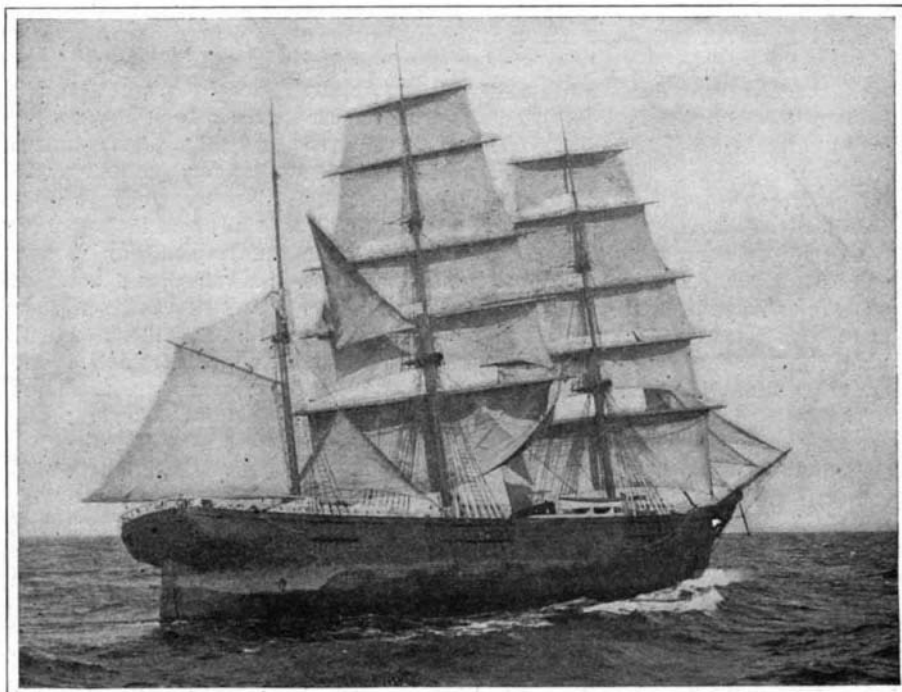
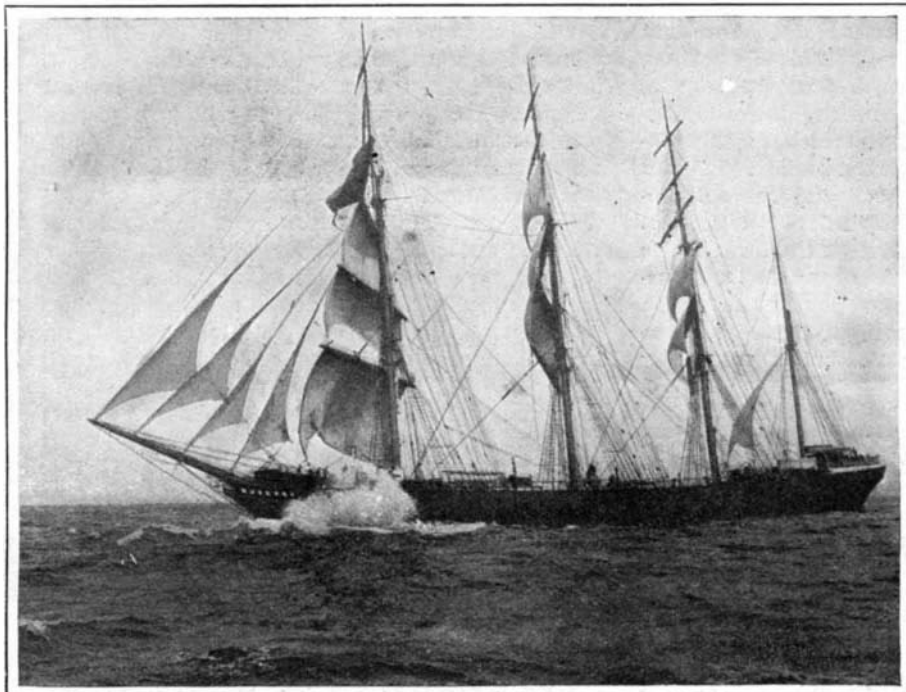
tives of the Bavarian railways. The ratio of volumes, high-pressure to low-pressure cylinders, has, at the same time, been decreased. The driving wheels are the largest that have yet been employed for four-cylinder compounds on the European continent. The principal object in the design is high speed with a light load, for which the 32 tons maximum adhesive power will

ceased in the United States, but the future output will not equal the loss through wreck, abandonment, and cutting down into barges."

The history of the square-rigger is inseparably interwoven with that of our country, and those who are conversant with the career of this type of vessel, will view its retirement with feelings of genuine regret.

ings of regret that the rapid disappearance of these vessels excites. Originally the craft "which drew the world together and spread the race apart," they developed a type of seamen such as the world had never seen, and which can never be duplicated under steam navigation.

Those competent to express an opinion, hold that



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**The English Ship "Muskoka," One of the Types of Vessel Charged with Running the Regulation Square-Rigger Out of Business.**

**The Bark "Coloma." A Type Which Made Its Appearance Many Years Ago, and May be Considered a Forerunner of the Modern Sailing Freighter.**

be fully adequate. Compounding and superheating are introduced as contributing to this end, while the total mechanical efficiency is increased at the cost of some few tons of weight extra, which has, in large part, been compensated for in the general design of the locomotive.

This engine, the first of a new series, was designed and built by the firm of J. A. Maffei at the English Garden Works, near Munich.

Authorities all agree that it was the handsomest rig of vessel that has ever engaged in traffic upon the ocean. There was beauty in every curve of the famous clippers that sped across the deep, and long before the era of arrogant steam, they had carried our flag to every seaport of the globe, and had given us a standing among the nations of the world.

Sentimental reasons do not alone enter into the feel-

there would be a serious national loss to safe navigation if the square-rigged fleet were allowed to die out as rapidly as it seems destined to do under prevailing conditions. The time will doubtless come when ship training will not be deemed essential to the successful navigation of an ocean steamer; but at the present moment many cling to the idea that those in command of steamships should have had preliminary schooling on a square-rigger.

In other countries, notably Germany, large steamship corporations keep in reserve sailing vessels, where the future officers of their steam fleets can receive training.

It is quite the fashion at the present time to place the responsibility for the decadence of American sailing vessels entirely upon the foreign ships that have entered into competition with them; but this is only half a truth. It is a well-known fact that these foreign ships can be operated much more cheaply than ours. Then, too, some are helped by government bounties, as for instance the French vessels, which can sail around the world in ballast and still make a profit. Vessels of this character, placed in competition with ours, necessarily tend to depress freight rates, and likewise secure considerable business that would otherwise go to American vessels. But the fact remains that the foreign square-riggers are having almost as keen a struggle for existence as our own. When foreign ship-owners allow fine large vessels to lie idle month after month in American ports, rather than attempt to run them at the ruinous rates that have prevailed for the past few years, it proves conclusively that the foreign owner of sail tonnage is not receiving much in the way of profits. Many foreign vessels, in the endeavor to keep in commission, have left Puget Sound ports with every cent of freight money drawn in advance and expended for loading and port charges, with the discharging expenses a dead loss to be borne at their journey's end. It was the foreign owners of sail tonnage that entered into an agreement not to accept charters below a certain figure, a movement that has had a tendency to improve rates, but to which American vessels have

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BY JAMES J. M'CURDY.

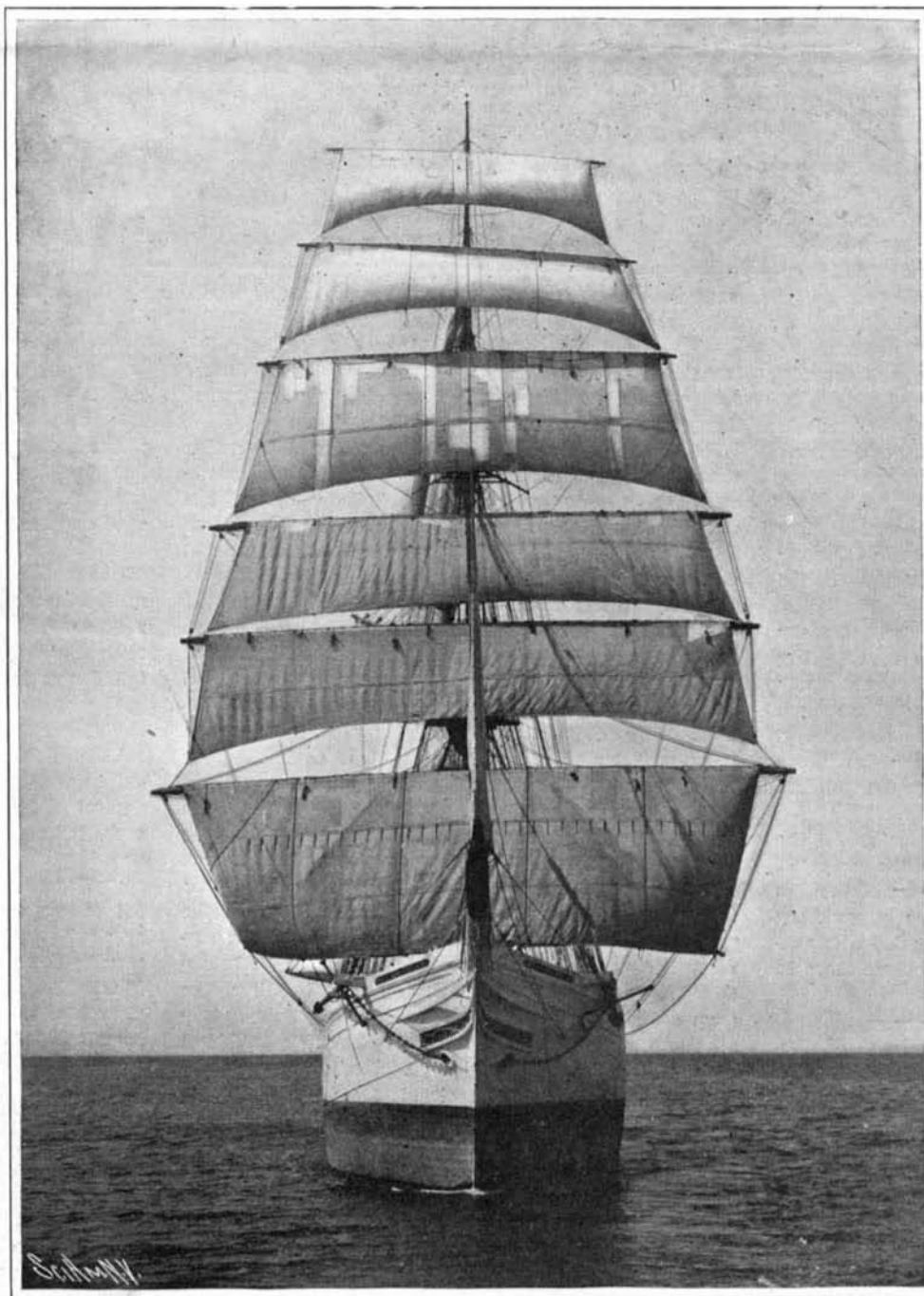
That the American square-rigged sailing vessel is being gradually forced from the ocean highways, where it was long an important factor in the world's carrying trade, has been apparent for some time to those well versed in maritime affairs. That the conditions which have brought about this result were likely to continue, thus rendering the future of this portion of our deep-sea merchant marine one of extreme uncertainty, was also quite well understood.

Yet few have realized that the outlook for vessels of this type is as serious as has been set forth by the Commissioner of Navigation in his last annual report, lately from the press.

Under the caption "Decline in American Square-rigged Shipping," the commissioner discusses the situation at some length, and places himself on record as of the opinion that the existence of our square-rigged fleet cannot under present conditions extend beyond the period of twenty years. The statistics submitted in support of this estimate seem logical and convincing.

On June 30, 1894, there were 633 square-rigged vessels flying the stars and stripes. By June 30, 1904, the number had diminished to 322, a decrease of 311, or 49 per cent. This, too, in face of the fact that by the annexation of Hawaii, 18 fine square-riggers were added to our merchant marine.

A second consecutive year has passed without the building of even one square-rigged vessel in the United States, something never heard of before. As the commissioner tersely expresses it, "the construction of square-rigged vessels has probably not entirely



**Barkentine "Makeweli"—a Cross Between a Ship and a Schooner.**

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